

with small, irregularly disposed fuscous dots. Individuals sometimes have the longitudinal markings much more distinct

than usual, presenting a markedly fasciate appearance; this form is not uncommon at West Chop, M. V.

NEW SPECIES OF PAPIRIUS.

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Papirius hagenii, n. sp.

Head translucent orange ochraceous, orange around mouth; eyes black; a few stiff, white bristles upon vertex and face. Antennae nearly as long as body, orange, becoming purplish on last two segments; basal segment naked; second four times the first in length, a few hairs distally; third equalling the second plus one-half the first, verticillate; terminal segment twice the basal, whorled as usual. Thorax yellow. Abdomen oval in dorsal aspect, dark purple, almost black, covering the sides and meeting the pale ventral surface with a well-defined but zig-zag margin; on posterior half of dorsum, a yellowish brown pattern, very variable (sometimes almost absent) but consisting fundamentally of a median elongated mark widening behind and one quarter the length of the abdomen, lying between four rounded triangular spots, the anterior pair of which are more or less three-lobed. These five spots may be separate, but the three anterior usually unite into a figure having a large posterior median lobe, three lateral lobes and a large anterior median sinus; the two posterior spots may unite to form a long, irregular crescent before the apex of the abdomen; abdomen with a few short, white bristles on apical half; many two or three times longer upon the yellow anal tubercle. Legs yellow, paler at base; tibia spiny; claws transparent, slender, rather straight, little curved inside; superior claw with a sharp tooth inside, one third from apex; second tooth obscure, in the middle; inferior claw two thirds the other in length, with one stout, knobbed tenent hair, twice as long,

fixed to its inner side except at the tip, which is free. Furcula (Tullberg's name for the spring) extending to mouth, stout, pale yellow at base, becoming white distally; manubrium (basal segment) over two thirds the dentes (middle segments) in length; dentes three times mucrones (apical segments), each dens with a row of long spines on either side; mucrones cylindrical, apex rounded, minutely serrate beneath; ventral abdominal surface with an oval, yellow swelling either side the manubrium and two similar but much larger ones placed obliquely and anteriorly. Average length, 1.3 mm.; maximum, 1.5 mm.

Described from over twenty specimens collected by me in October and early November, 1895, at Arlington, Mass. This active, uncommon species occurred in pine woods under damp, decaying twigs and needles.

Papirius pini, n. sp.

Chestnut brown, except for white claws, mucrones and bristles. Head paler; eyes black; a few short, stiff bristles upon a protuberance on vertex and down sides of face. Antennae four-fifths the length of body; basal segment stout, naked; second four times as long, a few long hairs distally; third equalling the first two, with distal half of seven false sub-segments and three less evident, swollen terminal ones; each sub-segment with a pair of hairs; a few hairs near base of third segment; fourth equal to basal, with short hairs. Abdomen ovate dorsally, dilated at sides; dorsum darker, with several long white bristles anteriorly

and very short bristles posteriorly; anal tubercle with long, stiff bristles. Legs long, slender, spiny, especially on tibia; superior claw long, rather straight, clearly bidentate inside, with a sharp tooth in the middle and another midway between it and the tip; a third tooth on the outside, nearly opposite the last; inferior claw with straight, tapering sides and an apical hair hardly longer than the other claw; the extreme tip of the claw is really free from the hair; on the inside of the inferior claw, near the base, is a dilation whose apex bears a short bristle. Furcula pale, extending beyond ventral tube; manubrium stout; each dens with a row of long spines on either side; mucrones tapering, one-third length of dentes, coarsely serrate beneath. Average length, 1.6 mm.

Described from twelve specimens found during October and until middle November at Arlington, Mass.

This species eats wet, decaying wood on the under side of pine logs, its color being mimetic. The last specimens found, before severe frost, were all females, which laid numerous eggs in captivity when given natural conditions of moist food, air and darkness. These eggs, laid singly, were spherical with strongly flattened base, translucent white, smooth, .2 mm. in diameter, .15 mm. high and with embryo quite undeveloped several days after deposition.

Papirius testudineatus, n. sp.

Dark purple, almost black, with conspicuous wax-yellow patterns. Head large; face with large markings and a few short bristles; vertex with a few longer bristles and a stirrup-shaped mark on middle; behind this, a long, broken, transverse band; eyes black; antennae seven-tenths the length of body, purplish; basal segment twice as thick as second, crenate apically; second on anterior edge of first, five times as long, somewhat petiolate, with a few hairs; third equalling

first two, slightly petiolate, gradually forming false sub-segments distally, of which seven are evident, followed by three swollen ones, the penultimate sub-segment being much dilated; terminal segment equal to basal in length; third and fourth segments with whorls of long hairs. Abdomen ovate dorsally, with a large pattern composed principally of thick median longitudinal and oblique bars; on anterior third of dorsum, a median bar whose posterior end meets the vertices of two widely V-shaped marks, one on either side; behind this, a roughly scissor-like pattern with two long oblique branches on either side and a short, median anterior lobe; on apical half of dorsum, a roughly anchor-shaped marking and two large, pale yellow tubercles, one on either side; dorsum with a few long bristles anteriorly, many shorter ones posteriorly; sides with large roundish and elongated spots; anal tubercle large, with several large spots and many long, stiff bristles. Legs very long, slender, hairy, with broad alternate bands of purple and yellow except on tibia; claws white; superior claw long, of rather uniform width, bent only towards tip, divided on the inside nearly into thirds by two prominent teeth; inferior claw half as long, long conical, free at extreme tip but apparently prolonged into a bristle a little longer than the claw; a short bristle on inside of inferior claw at its base. Furcula long, nearly reaching the mouth, purplish; each dens with a row of long spines on either side; mucrones white, cylindrical, apex rounded, one-third length of dentes, serrate beneath. Length, 2.2 mm.

Four specimens of this species were found in company with *P. pini* and also laid a few eggs in captivity. These eggs differed from those of *P. pini* only by being a little larger.

Types of the above species have been deposited in the Cambridge Museum of Comparative Zoölogy. I wish to thank Mr. Samuel Henshaw, of the museum, for his kindness in supplying me with types as well as literature of Thysanura.